Journal of
POLYMER SCIENCE

VOLUME 60 • 1962

Editorial Board: R. M. FUOSS • J. J. HERMANS • H. MARK
H. W. MELVILLE • C. G. OVERBERGER • G. SMETS

Advisory Board:

T. ALFREY, JR. *Midland, Mich.*
W. O. BAKER *Murray Hill, N. J.*
P. D. BARTLETT *Cambridge, Mass.*
H. BENOIT *Strasbourg*
E. R. BLOUT *Cambridge, Mass.*
J. W. BREITENBACH *Vienna*
C. W. BUNN *Welwyn Garden City*
G. M. BURNETT *Aberdeen*
S. CLAESSON *Uppsala*
F. S. DAINTON *Leeds*
P. DEBYE *Ithaca, N. Y.*
F. EIRICH *Brooklyn, N. Y.*
P. J. FLORY *Pittsburgh, Pa.*
N. G. GAYLORD *New York, N. Y.*
G. GEE *Manchester*
A. KATCHALSKY *Rehovoth*
G. M. KLINE *Washington, D. C.*
I. M. KOLTHOFF *Minneapolis, Minn.*
W. KUHN *Basel*
M. MAGAT *Paris*
C. S. MARVEL *Tucson, Ariz.*
G. NATTA *Milan*
A. PETERLIN *Durham, N. C.*
C. C. PRICE *Philadelphia, Pa.*
C. H. SADRON *Strasbourg*
G. V. SCHULZ *Mainz*
H. M. SPURLIN *Wilmington, Del.*
A. J. STAVERMAN *Leiden*
W. H. STOCKMAYER *Hanover, N. H.*
A. V. TOBOLSKY *Princeton, N. J.*
K. UEBERREITER *Berlin*
B. H. ZIMM *La Jolla, Calif.*

INTERSCIENCE PUBLISHERS, INC.

Copyright © 1962, by John Wiley & Sons, Inc.

CONTENTS

Vol. 60, Issue Nos. 169–170

Journal of Polymer Science

ISSUE NO. 169, JULY

J. MANN and L. ROLDAN-GONZALES: Orientation in Nylon Spherulites: A Study by X-Ray Diffraction 1
L. A. ERREDE and R. S. GREGORIAN: The Chemistry of Xylylenes. XIII. The Problem of Crystallinity and Crosslinking in Poly(*p*-Xylylene) 21
L. A. ERREDE and N. KNOLL: The Chemistry of Xylylenes. XIV. The Moldability and Thermal Stability of Poly(*p*-Xylylene) and Related Polymers 33
G. S. LEVINSON: Molecular Orbital Calculation of Monomer Reactivity Ratios 43
YUNG-FANG YU and ROBERT ULLMAN: Microscope Investigations of Extension and Fracture in Crystalline Polymers 55

LETTERS TO THE EDITORS

L. UTRACKI and E. TURSKA: On the Range of Adaptability of Tung's Method of Constructing the Molecular Weights Distribution Curves of High Polymers S1
N. G. MCCRUM: The Variation of Internal Friction in Polychlorotrifluoroethylene with Density and Temperature S3
N. TAMURA: ESR Spectra of Polytetrafluoroethylene Irradiated at 77°K S5
J. F. RUDD: Low Shear Melt Viscosity of Polystyrene S7
S. STRELLA: Relation Between Steady Flow and Dynamic Viscosity S9
J. C. H. HWA: The Stereochemical Configuration of Poly(methacrylic Anhydride) and Its Derivatives S12
SEYMOUR NEWMAN and R. L. MILLER: Crystal Strain in Oriented Crystalline Polystyrene S14
L. C. CASE: Comments on the Irradiation of Polypropylene S18
D. BROWNAWELL and I-MING FENG: Mesomorphic Character in Polymers S19
G. M. BRISTOW and M. R. PLACE: Estimation of $\bar{M}_n$ from Osmotic Pressure Measurements S21
J. LANDO, N. MOROSOFF, H. MORAWETZ, and B. POST: Single Crystal Character of Polyoxymethylene Prepared from Single Crystals of Trioxane S24
S. OKAMURA, K. HAYASHI, and M. NISHII: Polymer Crystals Obtained by Radiation Polymerization of Trioxane in Solid State .. S26

F. G. R. GIMBLETT: The Ionization and Polymerization of Phosphonitrilic Chloride Trimer S29
L. MANDELKERN, J. C. HALPIN, and A. F. DIORIO: Melting and Contractility of Feather Keratin S31
N. GRASSIE and J. R. MACCALLUM: The Kinetics of Depolymerization S33
P. M. DE WOLFF: On the Lorentz Factor for Integrated Intensities from Azimuthal and Radial Diffractometer Records of Fiber Patterns S34
N. L. ZUTTY and J. A. FAUCHER: The Stiffness of Ethylene Copolymers S36
G. FILIPOVICH: On Interpretation of Nuclear Magnetic Resonance Curves for Some Solid Polypeptides S37

Polymer News S39

NOTES

S. TOBY AND E. F. RUTZ: The Polymerization of Gaseous Formaldehyde S41
R. H. MICHEL and W. A. MURPHEY: Oppenauer Oxidation of Polymeric Alcohols S45
R. E. COOPER, J. UPADHYAN, and A. WASSERMANN: Fractionation of Alginates S46
I. PASQUON: Discussion on the Polymeric Chain Termination Processes in the Stereospecific Polymerization of Propylene S47
KOZO HIROTA and KEIJI KUWATA: On the ESR of Radical Anions in the Anionic Polymerization Initiated by Metallic Sodium S52
G. S. HAMMOND and K. R. KOPECKY: Rate of Polymerization of 2,2-Dideuterostyrene S54
R. M. JOSHI: Influence of Association on the Heats of Polymerization S56
I. SERLIN and A. H. MARKHART: New Linear Heterocyclic Polymers: Polypyrimidonequinazolones S59

ERRATA

MARKUS REINER, *Lectures on Theoretical Rheology*, 3rd ed., North-Holland Publishing (reviewed in *J. Polymer Sci.*, **47**, 539, 1960) .. S64

ISSUE NO. 170, AUGUST

EUGENE C. WINSLOW and ARTHUR LAFERRIERE: Thermally Stable Salts of Polyvinylphthalic Acid 65
MASAKAZU INOUE: Morphology of Polypropylene Spherulites 81
RUTH GIUFFRIA: The Microscopic Structure of Rigid Polyurethane Foam 91
FRANZ WENGER: Effects of Impurities on the Control of Anionic Batch Polymerizations 99
J. LLOPIS and J. A. SUBIRANA: Equation of State for Monolayers of Chain Molecules 113
HAROLD S. MICKLEY, ALAN S. MICHAELS, and ALBERT L. MOORE: Kinetics of Precipitation Polymerization of Vinyl Chloride 121

K. L. Paciorek, W. G. Lajiness, and C. T. Lenk: Differential Thermal Analysis of Fluoroelastomer Systems 141
David W. West and C. S. Marvel: Crosslinking Polyepichlorohydrins with Dimercaptans 149
C. A. J. Hoeve and P. J. Flory: Elasticity of Crosslinked Amorphous Polymers in Swelling Equilibrium with Diluents 155

LETTERS TO THE EDITORS

W. Prins: Comments on the Paper "Elasticity of Crosslinked Amorphous Polymers in Swelling Equilibrium with Diluents," by C. A. J. Hoeve and P. J. Flory S65
C. A. J. Hoeve and P. J. Flory: Limitations on the Application to Semicrystalline Fibers of Thermoelastic Relations for High Elastic Materials: A reply to W. Prins S67
William T. Wickham: On the Mechanism of Short-Branch Formation in High Pressure Ethylene Polymerization S68
Stanley J. Gill and Robert Toggenburger: A Determination of Molecular Entanglements in Polymer Solutions by Strain Birefringence Measurements S69

NOTES

D. G. LeGrand: Detection of Crystalline Phase Transition by Magnetic Susceptibility S71

BOOK REVIEWS

Preprints of Papers Read at the Fifth International Symposium on Free Radicals, July 6–7, 1961, Institute of Physical Chemistry, University of Upsala. Reviewed by Cheves Walling S73
The Biosyntheses of Proteins, H. Chantrenne. Reviewed by Herbert Morawetz S73

Abstracts from *High Molecular Weight Compounds* (*Vyskomolekulyarnye Soedineniya*), Volume III, Issue 9, September 1961 ..... S75

Author Index S83

Subject Index S85

AUTHOR INDEX, VOLUME 60

Bristow, G. M., and Place, M. R.: Estimation from osmotic pressure measurements, S21

Brownawell, D., and Feng, I.-M.: Mesomorphic character in polymers, S19

Case, L. C.: Comments on the irradiation of polypropylene, S18

Cooper, R. E., Upadhyan, J., and Wassermann, A.: Fractionation of alginates, S46

De Wolff, P. M.: On the Lorentz factor for integrated intensities from azimuthal and radial diffractometer records of fiber patterns, S34

Diorio, A. F.: see Mandelkern, L.

Errede, L. A., and Gregorian, R. S.: The chemistry of xylylenes. XIII. The problem of crystallinity and crosslinking in poly(*p*-xylylene), 21

——, and Knoll, N.: The chemistry of xylylenes. XIV. The moldability and thermal stability of poly(*p*-xylylene) and related polymers, 33

Faucher, J. A.: see Zutty, N. L.

Filipovich, G.: On interpretation of nuclear magnetic resonance curves for some solid polypeptides, S37

Flory, P. J.: see Hoeve, C. A. J.

Gill, S. J., and Toggenburger, R.: A determination of molecular entanglements in polymer solutions by strain birefringence measurements, S69

Gimblett, F. G. R.: The ionization and polymerization of phosphonitrilic chloride trimer, S29

Giuffria, R.: The microscopic structure of rigid polyurethane foam, 91

Grassie, N., and MacCallum, J. R.: The kinetics of depolymerization, S33

Gregorian, R. S.: see Errede, L. A.

Halpin, J. C.: see Mandelkern, L.

Hammond, G. S., and Kopecky, K. R.: Rate of polymerization of 2′,2-dideuterostyrene, S54

Hayashi, K.: see Okamura, S.

Hirota, K., and Kuwata, K.: On the ESR of radical anions in the anionic polymerization initiated by metallic Na, S52

Hoeve, C. A. J., and Flory, P. J.: Elasticity of crosslinked amorphous polymers in swelling equilibrium with diluents, 155

——, and Flory, P. J.: Limitations on the application to semicrystalline fibers of thermoelastic relations for high materials: A reply to W. Prins, S67

Hwa, J. C. H.: The stereochemical configuration of poly(methacrylic anhydride) and its derivatives, S12

Inoue, M.: Morphology of polypropylene spherulites, 81

Joshi, R. M.: Influence of association on the heats of polymerization, S56

Knoll, N.: see Errede, L. A.

Kopecky, K. R.: see Hammond, G. S.

Kuwata, K.: see Hirota, K.

Laferriere, A.: see Winslow, E. C.

Lajiness, W. G.: see Paciorek, K. L.

Lando, J., Morosoff, N., and Post, B.: Single crystal character of polyoxymethylene prepared from single crystals of trioxane, S24

LeGrand, D. G.: Detection of crystalline phase transition by magnetic susceptibility, S71

Lenk, C. T.: see Paciorek, K. L.

Levinson, G. S.: Molecular orbital calculation of monomer reactivity ratios, 43

Llopis, J., and Subirana, J. A.: Equation of state for monolayers of chain molecules, 113

MacCallum, J. R.: see Grassie, N.

Mandelkern, L., Halpin, J. C., and Diorio, A. F.: Melting and contractility of feather keratin, S31

Mann, J., and Roldan-Gonzales, L.: Orientation in nylon spherulites: A study by x-ray diffraction, 1

Markhart, A. H.: see Serlin, I.

Marvel, C. S.: see West, D. W.

McCrum, N. G.: The variation of internal friction in polychlorotrifluoroethylene with density and temperature, S3

Michaels, A. S.: see Mickley, H. S.

Michel, R. H., and Murphey, W. A.: Oppenhauer oxidation of polymeric alcohols, S45

Mickley, H. S., Michaels, A. S., and Moore, A. L.: Kinetics of precipitation polymerization of vinyl chloride, 121

Moore, A. L.: see Mickley, H. S.

Morosoff, N.: see Lando, J.

Murpher, W. A.: see Michel, R. H.

Newman, S., and Miller, R. L.: Crystal strain in oriented crystalline polystyrene, S14

Nishii, M.: see Okamura, S.

Okamura, S., Hayashi, K., and Nishii, M.: Polymer crystals obtained by radiation polymerization of trioxane in solid state, S26

Paciorek, K. L., Lajiness, W. G., and Lenk, C. T.: Differential thermal analysis of fluorelastomer systems, 141

Pasquon, I.: Discussion on the polymeric chain termination processes in the stereospecific polymerization of propylene, S47

Place, M. R.: see Bristow, G. M.

Post, B.: see Lando, J.

Prins, W.: Comments on the paper, "Elasticity of crosslinked amorphous polymers in swelling equilibrium with diluents," S65

Reiner, M.: (*errata*), S64

Roldan-Gonzales, L.: see Mann, J.

Rudd, J. F.: Low shear melt viscosity of polystyrene, S7

Rutz, E. F.: see Toby, S.

Serlin, I., and Markhart, A. H.: New linear heterocyclic polymers: Polyprimidonequinazolones, S59

Strella, S.: Relation between steady flow and dynamic viscosity, S9

Subirana, J. A.: see Llopis, J.

Tamura, N.: ESR spectra of polytetrafluoroethylene irradiated at 77° K., S5

Toby, S., and Rutz, E. F.: The polymerization of gaseous formaldehyde, S41

Toggenburger, R.: see Gill, S. J.

Turska, E.: see Utracki, L.

Ulmann, R.: see Yu, Y.-F.

Upadhyan, J.: see Cooper, R. E.

Utracki, L., and Turska, E.: On the range of adaptability of Tung's method of constructing the molecular weights distribution curves of high polymers, S1

Yu, Y.-F., and Ulmann, R.: Microscope investigations of extension and fracture in crystalline polymers, 55

Wasserman, A.: see Cooper, R. E.

Wenger, F.: Effects of impurities on the control of anionic batch polymerizations, 99

West, D. W., and Marvel, C. S.: Crosslinking polyepichlorohydrins with dimercaptans, 149

Wickham, W. T.: On the mechanism of short-branch formation in high-pressure ethylene polymerization, S68

Winslow, E. C., and Laferriere, A.: Thermally stable salts of polyvinylphthalic acid, 65

Zutty, N. L., and Faucher, J. A.: The stiffness of ethylene copolymers, S36

SUBJECT INDEX, VOLUME 60

Alcohols, polymeric, Oppenauer oxidation, S45
Alginates, fractionation, S46
Anionic polymerization, effects of impurities, 99
  electron spin resonance of radical anions, S52
Branch, mechanism of formation in ethylene polymerization, S68
Chain molecules, monolayers, equation of state, 113
Chain termination, processes, polymerization of propylene, S47
Copolymers, ethylene, stiffness, S36
Crosslinking, polyepichlorohydrins and dimercaptans, 149
Crystal, character of polyoxymethylene, S24
  radiation polymerization of trioxane, S26
  strain in oriented polystyrene, S14
Crystalline phase transition, detection by magnetic susceptibility, S71
Crystalline polymers, extension and fracture, 55
Depolymerization, kinetics, S33
2,2-Dideuterostyrene, rate of polymerization, S54
Differential thermal analysis, fluoroelastomer systems, 141
Elasticity, crosslinked amorphous polymers, 155, S65, S67
Electron spin resonance, polytetrafluoroethylene, S5
  radical anions in anionic polymerization, S52
Equation of state, monolayers of chain molecules, 113
Ethylene, mechanism of short-branch formation, S68
  stiffness of copolymers, S36
Feather keratin, melting and contractility S31
Fiber, patterns, Lorentz factor, S34
Fluoroelastomer, differential thermal analysis, systems, 141
Formaldehyde, gaseous, polymerization, S41
Heats of polymerization, influence of association, S56
Heterocyclic polymers, new linear, S59
Irradiation, of polypropylene, S18
Keratin, feather, melting and contractility, S31
Lorentz factor, fiber patterns, S34
Magnetic susceptibility, crystalline phase transition, S71
Mesomorphic character, S19
Microscopic structure, polyurethane, 91
Molecular entanglements, strain birefringence, S69
Molecular weight, distribution, Tung, S1
  estimation, S21
Monomer reactivity ratios, calculation, 43
Nuclear magnetic resonance, polypeptides, S37
Nylon, spherulites, orientation, 1
Oppenauer oxidation, polymeric alcohols, S45
Orientation, nylon spherulites, 1
Oxidation, polymeric alcohols, S45
Phosphonitrilic chloride trimer, ionization and polymerization, S29
Polychlorotrifluoroethylene, internal friction, S3
Polyepichlorohydrins, crosslinking with dimercaptans, 149
Poly(methacrylic anhydride), stereochemical configuration, S12
Polyoxymethylene, single crystal character, S24
Polypeptides, nuclear magnetic resonance curves, S37
Polypropylene, irradiation, S18
  morphology of spherulites, 81
Polypyrimidonequinazolones, S59
Polystyrene, crystal strain, S14
  shear melt viscosity, S7
Polytetrafluoroethylene, electron spin resonance spectra, S5
Polyurethane, rigid foam, microscopic structure, 91
Polyvinylphthalic acid, thermally stable salts, 65
Poly(*p*-xylylene), crystallinity and crosslinking, 21
  moldability and thermal stability, 33

Propylene, chain termination processes, S47
Reactivity ratios, calculation, 43
Spherulites, morphology, polypropylene, 81
orientation in nylon, 1
Stereochemical configuration, poly(methacrylic anhydride), S12
Strain birefringence, molecular entanglements in polymer solutions, S69
Trioxane, crystal character of polyoxymethylene, S24
radiation polymerization crystals, S26
Tung's molecular weight distribution curves, S1
Vinyl chloride, kinetics of precipitation polymerization, 121
Viscosity, dynamic, relation with steady flow, S9
shear melt, polystyrene, S7
Xylylenes, crystallinity and crosslinking, 21
moldability and thermal stability, 33